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Patentanmeldung Nr. Patent application No. Demande de brevet n°

03290853.5

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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Data carrier for storing files, apparatus for managing such a carrier and method for processing data in such a disc

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s) revendiquée(s)
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DATA CARRIER FOR STORING FILES, APPARATUS FOR MANAGING SUCH A CARRIER AND METHOD FOR PROCESSING DATA IN SUCH A DISC.

The present invention relates to a data carrier for storing files.

The invention also relates to an apparatus for managing the files stored in a data carrier comprising a light source for illumination an optical data carrier and a motor for driving said data carrier and a method for processing data in such a disc.

The patent document WO 00/58958 discloses such an apparatus.

The invention finds applications notably for the optical data carrier, known as SFFO (Small Form-Factor Optical), having the ability to be rewritable. These data carriers are used with apparatus supplied by batteries, so it is important that the battery life is as long as possible.

The SFFO carriers are driven at constant angular velocity. The measures that the invention proposes turn to account the properties of the constant angular velocity.

A data carrier in accordance with the invention comprises files the transfer rate of which are dependent of their place on the data carrier, the files often required by the user are on a place that provides a high rate file transfer.

The basic idea of the invention is that the supply power is consumed when the carrier is driven and the light source is on. For instance if the user wants to play often a MP3 file having 4.5 MB, it lasts 1s for being transferring in a process unit for being listened by the user if the file is on the outer part and 2s if the file is inner part of the disc. So the supply power is economized by using less the motor and the source light.

The invention relates to a method for economizing the supply energy of an apparatus managing a data carrier having consuming elements which consumes supply energy during a transfer of data from the data carrier, method comprising the steps of:

- determining the more often used files,
- allocating the more often used files in places on the carrier which are the more fast for transferring,
- supplying off said consuming elements when transfer is made.

These and other aspects of the invention are apparent from and will be elucidated, by way of non-limitative example, with reference to the embodiment(s) described hereinafter.

In the drawings:

Fig.1 shows an apparatus in accordance with the invention,

Fig.2 shows a data carrier in accordance with the invention

Fig.3 shows a block scheme of a processor set for an apparatus in accordance with the invention.

Fig.4 shows a scheme for the managing of files in a data carrier in accordance with the invention.

The Fig.1 shows an apparatus, in which a data carrier 1 having a disc form is placed. This data carrier may be an optical disc. In the Fig.1, the carrier is shown in cross section. A disc motor 3 rotates the carrier. On this carrier 1, a lens 12 focuses a laser light beam 14. The laser is mounted in a sledge 16 that can be moved by a sledge motor 20 for exploring the whole disc as indicated by the arrow 22. Inside this sledge, a laser diode 25 is placed for illuminating the optical data carrier. The sledge contains also photo detectors, not shown, that provide signals. These signals are used, on the one hand, for the providing of useful information, for instance to a loudspeaker 32 via an user interface circuit 34 and, on the other hand, for controlling various servos via a control interface 38. A split device 42 splits these signals for being rightly directed to the interface circuits 34 and 38. A processor set 50 controls all the working of the apparatus. A battery 52 supplies this apparatus. A charger device 54 can charge the battery when it is needed. Two switches 56 and 58 indicate some aspects of the supplying of the apparatus. When the switch 56 is on, the motors 20 and 3 are supplied and the laser diode 25 too. When it is off said elements 20, 3 and 25 are not supplied. The other elements of the apparatus stay supplied. A great part of the energy is consumed, when the switch 56 is on.

When a file placed on the disc 1 is required, the disc 1 is driven at a constant speed or angular velocity (CAV). So, it must be noticed that the rate of data are higher at the outer radius of the disc than at the inner. For instance the bit rate is about 18 Mbps at the inner and 36 Mbps at the outer. Then reading the same file from the inner radius instead of the outer radius requires one second longer. For this second the laser diode 25 is switch on and the disc 1 is spinning. The difference in supply power is significant. The

switch 56 after the transfer can be off and an economy of energy is obtained when the transfer time is shorter.

The invention proposes to allocate the most frequently used files close to the outer radius, so that the battery life can be significantly increased.

Fig.2 shows, in a very schematically way, the places of various files on the optical disc1. The files F1 and F2 are files frequently used and file F10 less used.

By analyzing the use of the files it is possible to determine how often they are read. The processor set 50 as shown in the fig.3 comprises a processor 60 a counter 62, which can be realized in a software way and a table 64. So it is possible to store the repetitions of the file usage. In this table 64 the names of used files F1, F5,...Fn are stored and in regard the number of times that the file is used k1, k5,.. kn. Another way is to take into account the order of the files as defined by the playlists (taking into account the most frequently used playlists)

The counters can be reset after the files on the disc have been re-allocated for placing the more used file in the outer place of the disc. This may distort the system because a file is used a lot during short time and this usage does not reflect the longer-term file usage. Alternatively the date the file was last used could be stored along with the counter to record whether the file was recently used. When performing the re-allocation other factors need to be taken into account as well as the frequency of file usage. For example, the size of the files must be considered.

The reallocation will typically be done when the disc is in an apparatus connected to a power supply e.g. when it is recharging its batteries or when the disc is placed in a fixed device such as a PC. The system may want to record when re-allocation was last performed so that the files are not reallocated too often (this may result in degradation of the disc as the same fast locations are overwritten too often).

Another embodiment of the invention proposes to use UDF File system well known in the state of the art.

There are two ways to implement this feature in the UDF File System. In both cases an UDF implementation that is not aware of this feature will still be able to read the files without problem.

UDF allows applications to define an extension to the File Entry table for their own use. This is called "Application Use Extended Attribute" (see Fig.4). The shown table

INF provide for a given file FA a room EXFA for an extra information. The usage is not defined in the UDF specification; it is up to the application using the file system to decide how to use it. The way this will work in practice is that the application will read and set the values of this field and therefore control its use. This field is specified in the UDF file system, so an implementation that does not support this extension field will still be able to read a disc that does use it. The usage of this extra field may be used to implement file usage counting but it may lead to problems if an implementation already uses this field for another reason. With this solution the counting must be done by the file system, the application will know nothing about this field

Controlling the file counting from the application has an advantage because the application knows whether the file was actually used by the user. For example, the user may have skipped an audio track after a few seconds. In this case the application can choose not to count this as a file usage. Similarly, files may be accessed on disc and cached by the application but then not used by the user.

Performing the re-allocation can also be done under the application control. For example, when the disc is placed in a drive connected to a power supply (e.g. a PC) an application can analyse the file usage and then decide how to optimally re-allocate the file data. Then the application can choose to re-allocate the files so that the most used files are recorded on the outside of the disc. One way to do this is for the application to treat the disc as a block device and bypass the normal file system implementation. The application will create a disc image with the files in the correct locations and then copy the complete disc image including File System tables to disc.

It is also possible to let the file system perform the reallocation but then the file system implementation must implement the specific reallocation strategy.

CLAIMS.

1- A data carrier for storing files comprising files the transfer rate of which are dependent of their place on the data carrier, the files often required by the user are on a place that provides a high rate file transfer.

2- A data carrier as claimed in claim1 which is an optical data carrier having a disc form.

3- A data carrier as claimed in claims 1 or 2 which is a carrier having rewritable ability.

4- A data carrier as claimed in claims 1 to 3 comprising a frequency file for containing an indication of the use of files contained in it.

5- A data carrier as claimed in claim 4 wherein the frequency file is an UDF file type.

6- A data carrier as claimed in claim 5 which is SFFO type.

7- An apparatus suitable for managing a data carrier as claimed in claims 1 to 3 comprising driving means for driving said data carrier, means for reading the data stored in it, means for writing data in it, frequency means for determining the frequency of the use of files contained in the data carrier, allocating means for placing the more frequently used in aplace for a faster transfer, means for stopping, at least, said driving means when the transfer is made.

8- An apparatus as claimed in claim 7, wherein the frequency means are constituted by a table indicating the name of file in regard the number of times which is used.

9- An apparatus as claimed in claim 8 wherein the frequency means are constituted by a part which is placed on the data carrier.

10- An apparatus as claimed in claims 7 to 9 comprising a battery for supplying it, charging means for charging said battery, allocating means being set in working for the charging.

11- A method for economizing the supply energy of an apparatus managing a data carrier having consuming elements which consumes supply energy during a transfer of data from the data carrier, method comprising the steps of:

- determining the file more often used,
- allocating the more often used files in places on the carrier which are the more fast for transferring,
- supplying off said consuming elements when transfer is made.

DATA CARRIER FOR STORING FILES, APPARATUS FOR MANAGING SUCH A CARRIER AND METHOD FOR PROCESSING DATA IN SUCH A DISC.

ABSTRACT

The apparatus is suitable for managing a data carrier (1) in view of obtaining a fast transfer from it to the apparatus when the carrier is driven with a constant angular velocity (CAV). It comprises a motor (3) for driving the carrier, an optical head having a light source (16) for reading and/or writing data stored from and in it. Furthermore, it comprises means, involving a processor set (50), for determining the frequency of the use of files contained in the data carrier, for placing the more frequently used in a place for a faster transfer. As the transferring is performed, the motor and the light source are stopped so that supply energy is economized, which is interesting for an apparatus supplied by battery.

Application: The invention is well suited for small size R/W optical discs (SFFO).

Fig.1

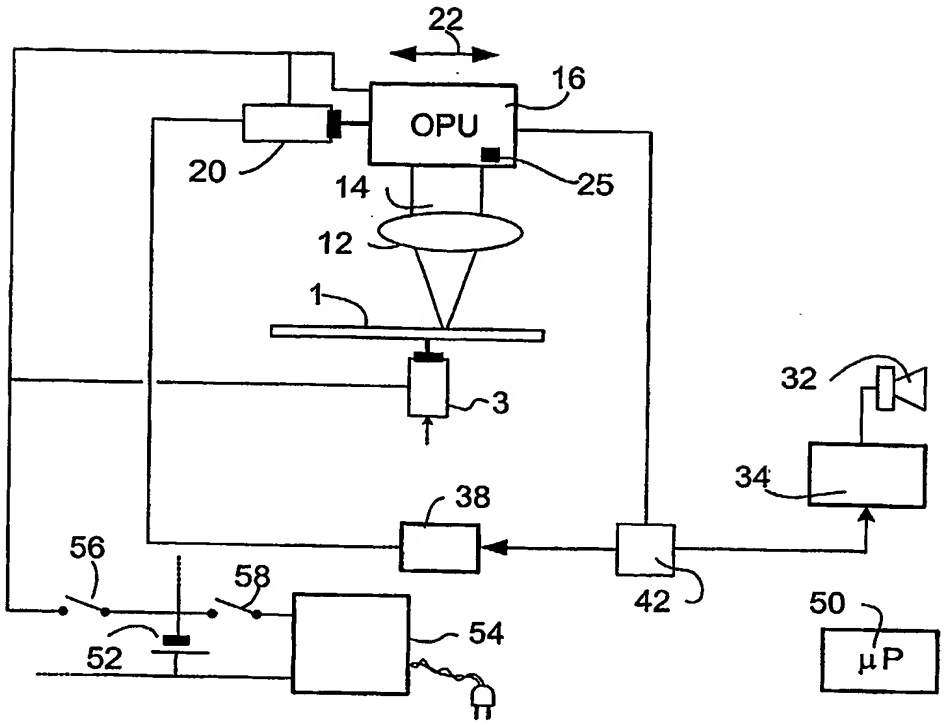

FIG.1

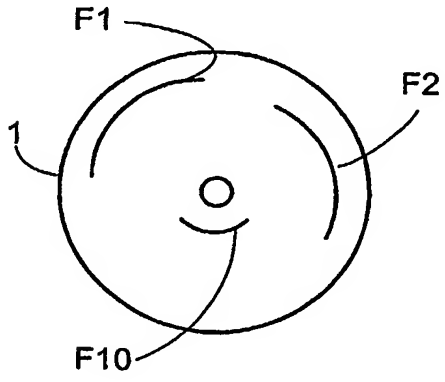

FIG.2

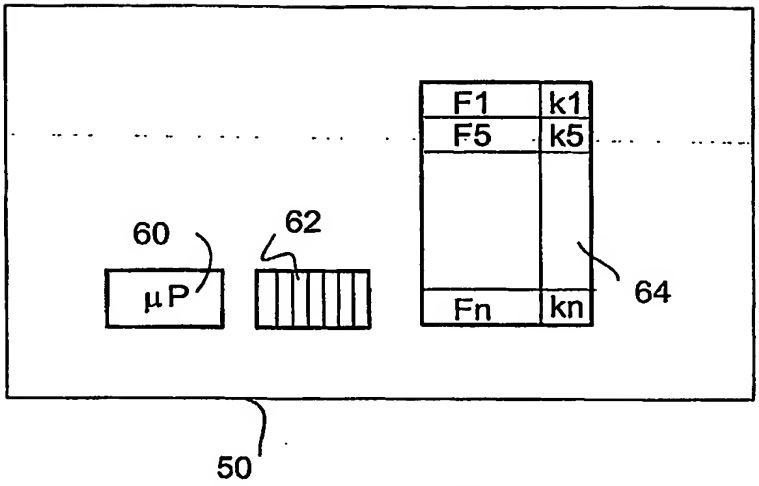

FIG.3

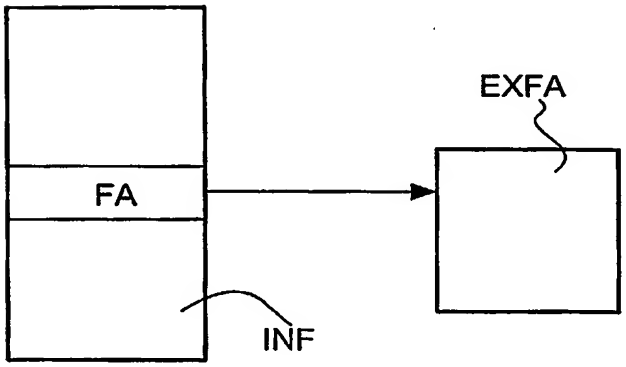

FIG.4

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